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FOOD OF THE EUROPEAN ROOK (*CORVUS FRUGILEGUS*).

AN interesting paper upon the food of the Rook, by Dr. Hollrung, appears in the Seventh Annual Report of the Experiment Station at Halle,* and furnishes some points for comparison with the food of our allied species of American birds.

The following is a list of the principal contents of 131 stomachs of rooks killed in April, May and June:

48 larvæ of <i>Zabrus</i>	22 <i>Tanymericus</i> .
	(Weevils).
<i>gibbus</i> .	Snails.
20 wire worms	Mice.
(<i>Elaterid larvæ</i>).	420 wheat grains.
253 grub worms.	471 barley grains.
160 May beetles.	190 oat grains.
1 688 <i>Otiorynchus</i>	22 cherries.
(Weevils).	

From this Dr. Hollrung arrives at the following conclusions:

"1. The rooks examined have proved on the whole neither exclusively useful nor exclusively injurious. While 25 per cent. of the rooks' stomachs contained no vegetable matter, there were only two cases in 131 where no animal matter was found.

"2. Their food consisted for the most part (about 66 per cent.) of animal matter, such as mice, larvæ of the grain-eating Carabid (*Zabrus gibbus*), grub worms (*Melolontha vulgaris*), dung beetles (*Aphodius spec.*), and clover weevils (*Otiorynchus ligustici*). The vegetable food was made up of wheat, oats and barley and cherries.

"3. The harm done by the rooks on the one hand was perfectly balanced, and even considerably outweighed on the other hand by the useful services rendered.

"4. The rooks feed principally on slowly moving insects."

The common crow (*Corvus americanus*)

*Siebenter Jahresbericht ueber die Thätigkeit der Versuchs-station für Pflanzen schutz zu Halle a. S. 1895, Dr. M. Hollrung.

represents, perhaps, in this country, as nearly as may be, the economic position occupied by the rook in Europe, and a few points of comparison in their food may not be without interest. The writer has examined about 900 stomachs of the American crow, taken at all times of the year and representing a considerable portion of the United States. Unfortunately Dr. Hollrung's rooks were all taken in the months of April, May and June, and within a restricted area of country, so that the stomachs probably show a larger percentage of animal food than the average for the whole year. The food of the crow for the same three months contains about the same proportion of animal and vegetable matter.

In the first four items of the above list the crow and the rook present a great similarity of taste, the *Lachnosterna* of this country replacing the *Melolontha* of Europe. It is in the next two items, the weevils, that the rook shines resplendent. An average of over thirteen specimens of those small but very harmful beetles in each of the 131 stomachs is certainly a splendid showing. The only American bird whose stomach the present writer has examined that can approach this record is the red-winged blackbird (*Agelaius phoeniceus*), which shows a very decided taste for the snout beetle.

While many of these beetles were eaten by the crow, they did not constitute so constant and important an item as in the case of the rook. The crow eats a considerable number of Carabid beetles, most of which are of the more predaceous species, while those eaten by the rook are for the chief part the larvæ of *Zabrus gibbus*, a very destructive grain-eating species. Grasshoppers, which are extensively taken by the crow, are conspicuously absent from the food of the rook.

In the varieties of vertebrate food the rook is far behind the crow. Only seven-

teen mice were found in the 131 stomachs, and in no case did any stomach contain the remains of more than one. The crow, on the other hand, not only preys upon mice and other small mammals, but even captures young rabbits and eats many snakes, young turtles, salamanders, frogs, toads and fish. The crow also eats many crayfish and other smaller crustaceans which do not appear in the rook's bill of fare.

In the matter of vegetable food the rook does not seem to indulge in any great variety in April, May and June, but probably the other months would show many additions to the list. The crow eats about every kind of grain that the country produces, besides fruit and acorns or other mast. The crow appears to be far more omniverous than the rook; in fact, it seems doubtful if there is anything eatable that a crow will not eat, while, as far as shown, the rook seems quite exclusive.

In the comparison of these two birds the evidence appears to be in favor of the rook, although the economic difference is not great.

The proportion of harmful insects is somewhat greater with the rook, and its vegetable food does not include so many items of useful grains as with the crow. It is not possible, however, to come to any very definite conclusion until more stomachs of the rook shall have been examined, covering the other months of the year.

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AN INVESTIGATION WITH RÖNTGEN RAYS, ON GERMINATING PLANTS.

THE marked attention which the Röntgen or X-rays are receiving from investigators of this and other countries, and the popular excitement felt in the investigations, render all papers on this subject of particular interest.

The first record of experiments with

these rays in their effect on plants known to the writer is a recent article by Alfred Schober presented to the German Botanical Society.* Schober was led to the investigation by the similarity between X-rays and ultra violet light, which was pointed out by Röntgen in his first paper. The subject appeared particularly worthy of investigation, as Sachs had shown that heliotropic curving is incited in plants by blue, violet and invisible ultra violet rays in about an equal degree with full white light; while the red, yellow and green parts of the spectrum are apparently inactive.

Rothert, in his very extensive work on heliotropism, found the cotyledon† of germinating oat plants to be particularly sensitive to the action of light, and these were thus selected for the experiment. Vigorous plants germinated in full light, with cotyledons from 1 to 2 centimeters long, were selected and set in damp sand in a dark box, the walls of which were about 1 centimeter thick and blackened on both sides. A Hittorf's tube was placed at one end of this box at the height of the seedlings and about one centimeter distant from the box. The seedlings were arranged at one end of the box so that they were about 2 centimeters distant from the tube. The inductor had a spark length of about 12 centimeters, and was kept at its highest capacity during the experiment. A photograph of a hand could have been taken under the same conditions at a distance of 30 centimeters in five minutes.

The plants were first exposed to the action of the rays for 30 minutes, after which an examination showed that no ap-

* Schober, Alfred, 'Ein Versuch mit Röntgenschen Strahlen auf Keimpflanzen.' *Berichte d. Deut. Bot. Gesellsch.* Bd. 14, Heft 3 (April, 1896), p. 108.

† *Cotyledo* is a term introduced by Rothert (Cohns' *Beiträge zur Biol. der Pflanzen*, Bd. 7, p. 25) to designate the leaf-like organ of the form of an almost cylindrical closed sheath which appears first after the roots in the germination of grass seeds.